The general conclusions to which he is led from the experiments detailed in this paper are the following :—First, that all bodies conduct electricity in the same manner, but in very different degrees;—Secondly, that in some the conducting power is powerfully increased by heat, in others diminished, and this without any difference that has yet been discovered, either in the general nature of the substance, or of the influence of electricity upon it;—Thirdly, that there is a numerous class of bodies which, when solid, insulate electricity, and, when fluid, conduct it freely, and are decomposed by it; yet that there are many fluid bodies which do not sensibly conduct electricity of low intensity; and some that conduct it, and are not decomposed; —and, Lastly, that fluidity is not essential to decomposition. Sulphuret of silver is the only body yet known to be capable of insulating a voltaic current when solid, and of conducting it, without decomposition, when fluid. No distinction can as yet be drawn between the conducting powers of bodies supposed to be elementary and those known to be compounds.

The Society then adjourned over Whitsun-week to the 6th of June.

June 6, 1833.

FRANCIS BAILY, Esq., Vice-President, in the Chair.

Captain John Lihou, R.N., was elected a Fellow of the Society.

Professor Desfontaines, of Paris; Professor C. G. J. Jacobi, of Königsberg; Baron von Lindenau, of Gotha; Professor Meckel, of Halle; and M. G. de Pontécoulant, of Paris, were elected Foreign Members of the Society.

A paper was read, entitled, "An Account of a Second Series of Experiments on the Resistance of Fluids to Bodies passing through them." By James Walker, Esq., F.R.S., Civil Engineer.

The author, in a paper read to the Society in the year 1827, and printed in the Philosophical Transactions, gave an account of some experiments showing that the resistance of fluids increases in a ratio considerably higher than the square of the velocity, and that the absolute resistance is smaller than had been deduced from the experiments of the French Academy. In the present communication he states the results of his further inquiries on this subject. His experiments were made at the East India Docks, on a boat twenty-three feet long and six wide, with the stem and stern nearly vertical; one end being terminated by an angle of 42°, and the other of 72°; and the resistance to the boat's motion being measured by a dynamometer. The results are given in tables: and it appears from them, that in light vessels sharpness is more important in the bow than in the stern; but that the reverse is the case in vessels carrying heavy cargoes. From another series of experiments the author infers that the resistance to a flat surface does not exceed 1·25lb. for each square

foot, at a speed of one mile per hour; increasing, for greater velocities, in a ratio considerably higher than the square of the velocity.

The author concludes with some observations on the results lately obtained in Scotland, where great velocities were given to boats moving on canals, without a proportional increase of resistance.

The reading of a paper, entitled, "Researches on the Arseniates, Phosphates, and Modifications of Phosphoric Acid," by Thomas Graham, Esq., M.A., F.R.S.E., Lecturer on Chemistry in the Andersonian Institution of Glasgow; communicated by Edward Turner, M.D., F.R.S.—was commenced.

June 13, 1833.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G., President, in the Chair.

Mr. Graham's paper was resumed and concluded.

The tendency of the arsenic and pnosphoric acids to form subsesquisalts with the oxides of silver and lead is well known; corresponding salts with alkaline bases also exist. The author describes the method of forming the subarseniate and subphosphate of soda, and their properties; and shows that they are subsesquisalts, containing one proportion and a half of base to one of acid. They are the only known soluble salts of that constitution; and it is remarkable, that the acid of the subphosphate of soda is not convertible into pyrophosphoric acid by the action of heat, like the acid of the common phosphate of soda. This may be explained on the hypothesis, that phosphoric acid, in contradistinction to pyrophosphoric acid, contains an atom of water, which stands in a basic relation to the acid, and which may be replaced by an atom of any of the usual bases. Hence also arises the disposition of phosphoric acid to form subsesquisalts; for the common phosphate, used as a precipitant, exchanges its basic water for a fixed base; and for this reason, likewise, phosphate of soda, or any neutral phosphate, cannot be made anhydrous without becoming a pyrophosphate; but the subphosphates having an excess of base, may be anhydrous, as Stromeyer observed; and indeed they are not convertible into pyrosalts. The acid formed by the combustion of phosphorus in air or oxygen, constitutes a third modification of phosphoric acid, distinguished by peculiar properties, and which, from the difference of its saturating power, in relation to that of the phosphoric and pyrophosphoric acid, the author considers as a *polymeric* phosphoric acid;—a term lately applied by Berzelius to bodies of the same relative composition, but differing in their combining proportions.

The author devoted much time and attention to determine the quantity of water of combination in the foregoing subsalts; but the result he obtained, namely 50·22 per cent., is not easily reconciled with our best data for atomic weights. It is, however, pretty nearly compatible with 23 or 24 atoms of water, according to Berzelius's weight of the atom of arsenic; and if the latter estimate be correct, it is curious